REMARKS

Claims 1-3, 8-9 and 11-17 were rejected under 35 U.S.C. 103 Sekijima in view of Wysocki or Kou. This rejection is respectfully traversed.

When single crystals are grown without using a seed crystal, the crystals grow in the same way as their nuclei which are naturally generated and function as the seed crystals and accordingly, the crystals have random orientations. Because the physical properties of the materials are dependent on their crystal orientations, it is important to grow crystals so as to have their intended orientation and this generally requires using a seed crystal in the method. The use of such seed crystals makes the production process complicated.

The inventors of the present invention determined that when a fiber-shaped single crystal is 3 mm or less in diameter, the densest surface produced is in the free surface normal to the growth direction of the crystals, even if a seed crystal is employed. This permits orientation of growth of the crystals to be controlled.

The Sekijima reference teaches an oxide single crystal growth method which, as the Examiner has recognized, requires the use of a seed crystal. In addition, as the Examiner has also recognized, there is no teaching or suggestion in this reference that when a fibrous-shaped single crystal is 3mm or less in diameter, the densest surface produced is in the free surface normal to the growth direction of the crystal. These deficiencies are not eliminated by the Wysocki or Kou references.

There is no basis for the proposed combination of Sekijima and Wysocki. The Sekijima patent relates to the formation of oxide single crystals while Wysocki is to the growth of titanium carbide single crystals. Moreover, Wysocki is based on the desire to fabricate titanium carbide ingots greater than 18 mm in diameter and addresses the

problem that before that reference, growth of titanium carbide was limited to ingots of approximately 10 mm in diameter using seeding techniques but for larger diameters, high quality titanium carbide single crystals of suitable size and orientation were not available for seeding. There is no rationale or motivation to combine Sekijima and Wysocki.

It appears Wysocki eliminates a seed crystal only because large size crystals are not available. The assertion that it would be obvious to eliminate the seed crystal to reduce cost is respectfully submitted to be an after-the-fact attempt to justification. If this justification was valid, it would have been possible to site a reference showing a process of making smaller size single crystals without a seed crystal. The absence of such a reference establishes that the attempt of justification is hindsight.

The combination of Kou and Sekijima is likewise inappropriate. Kou relates to an edged defined contact heater apparatus for use in a floating zone crystal growth method and contains no teaching or suggestion of forming a fiber shaped single crystal of 3 mm or smaller in diameter.

The Office Action assumes that since the shaper disclosed in Kou has small holes, a fiber-shaped crystal of 3 mm or less in diameter must be produced. This presumption is not correct. Kou's shaper 40 has an edge 42 that defines the shape or boundary of the cross-section of the monocrystalline body 30 that is formed as the molten surface solidifies. All of the drawings in the reference show the diameter of the polycrystalline feed and monocrystalline product are approximately the same. The function of the holes 46 in the heater 20 or any holes in shaper 40 is to allow flow of molten material between the polycrystalline rod side and the monocrystalline body side of the heater. The size of those holes do not define the diameter of the monocrystalline body product. The Examiner will note that regardless of the number of holes in the

shaper, only a single monocrystalline product was obtained rather than a plurality of products (as would result if the size of the holes defined the size of the product). The polycrystalline feed rods disclosed in the reference were 6 mm in diameter (column 9, lines 57-58) and accordingly, the monocrystalline product in Kou was clearly greater than 3 mm in diameter.

In addition to the foregoing, it should be noted that Kou indicates that no single crystal seeds are required only in the case that one is growing single crystals of $NaNO_3$ (column 10, lines 19-21) and there is no suggestion that the seeds can be eliminated with respect to any other type of crystal. $NaNO_3$ is a nitrate and not an oxide.

As in the case with Wysocki, there is no justification or motivation for combining Sekijima with Kou. The comments above concerning the attempt to justification of reducing cost by eliminating seed crystals is equally applicable here. Further, Kou teaches that the seed crystal can be eliminated only in the case of a nitrate and this fact further shows that the hypothesized justification constitutes hindsight.

Finally, the Office Action asserts that it would be inherent to the combination of Sekijima and Wysocki or Sekijima and Kou that the crystal grows in a direction normal to the densest surface. Even ignoring the improper combination of these references, this assertion is not valid. Inherency cannot be in based on an assertion that methods of two patents are "similar" or an assumed density of various zones.

Claims 4 and 10 were rejected under 35 U.S.C. 103 over the same combination of references in further view of Cordova-Plaza or Kobayashi. This rejection is also respectfully traversed. These additional references have been cited only to show that the laser heated pedestal growth method exists but the references are not asserted to, in

fact do they, cure the basic deficiencies in the combination applied to claim 1. The further combination of Cordova-Plaza or Kobayashi with the other references cannot, therefore, render the claimed invention obvious.

It is respectfully submitted that this application is now in condition to be allowed and the early issuance of a Notice of Allowance is respectfully solicited.

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Respectfully submitted,

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